THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume XIII MARCH, 1940 No. 3

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Hardenability Was Discussed 20 Years Ago

Archer Cites Reference to Early *Transactions*, but Definite Information Is Recent

By R. E. Christin

Columbus Chapter — R. S. (Bob) Archer, chief metallurgist, Republic Steel Corp., Chicago District, opened the February meeting with the remark that of all steel manufactured, only a small proportion—perhaps about 10%—is heat treated. This low percentage sounds surprising but is true considering the amount of strip, sheets, structural, and rails produced in the U.S.

The timely subject of "Hardenability in Steels", therefore, covered only those steels which are given a quench and draw treatment.

It was of interest to learn that this subject of hardenability was covered in the literature as far back as Volume I of the Society TRANSACTIONS. However, the various factors affecting hardenability were not known very definitely until comparatively recently.

Mr. Archer stated that maximum surface hardness, that is, martensitic

(Continued on page 8)

Compliments

To Corrosion Expert F. N. Speller, on the completion of nearly 40 years of service with National Tube Co. (director, department of metallurgy and research), who retired on March 1, but plans to keep active and do special consulting work in corrosion problems.

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To A.S.M. Members L. F. Lottier, of Peoples Gas, Light & Coke Co., A. G. Gierach, American Manganese Steel Co., H. C. Aufderhaar, Electro Metallurgical Co., and L. J. Haga, of Lewis Institute, on their part in conducting the 1940 Foundry Lecture Course sponsored by the Chicago Chapter of American Foundrymen's Association.

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To the Indianapolis Chapter for the services of Arthur E. Focke, research metallurgist for the Diamond Chain Mfg. Co., Chapter secretary in 1931-32, chairman 1932-34, and member of the Executive Committee ever since, who addressed the local Chapter meeting on March 18 on "Phase Diagrams".

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To Frederick M. Becket, president of Union Carbide and Carbon Research Laboratories, Inc., and consultant, Union Carbide and Carbon Corp., on being presented one of the Modern Pioneers Awards of the National Association of Manufacturers, and also on being selected to receive the Elliott Cresson Medal of the Franklin Institute in May.

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To Golden Gate Chapter Chairman J. G. McCallum, who has just opened a metallurgical laboratory of his own, where he will do consulting work and special testing.

A.S.M. Nominating Committee Members Named by President

In accordance with the constitution of the American Society for Metals, President James P. Gill has selected a nominating committee from the candidates submitted by the Chapters.

This committee will meet during the third full week in the month of May, and shall name one candidate for each of the following offices:

President ----------1 year
Vice-President ------1 year
Secretary ----------2 years
Two trustees for ----2 years each

The committee will welcome suggestions for candidates in accordance with the Constitution, Article IX, Section 1 (b), which provides that endorsements of a local executive committee shall be confined to members of its local Chapter, but individuals of a Chapter may suggest to the nominating committee any candidates they would like to have in office.

Endorsements should be sent in writing to the chairman or other members of the committee at the following addresses:

Charles H. Herty, Jr., Bethlehem Steel Co., Bethlehem, Pa. (Lehigh Valley Chapter), Chairman.

H. H. Lester, Watertown Arsenal, Watertown, Mass. (Boston Chapter).

Adam Steever, Columbia Tool Steel Co., Chicago Heights, Ill. (Chicago Chapter).

William H. Swanger, National Bureau of Standards, Washington, D.C. (Washington Chapter).

W. H. Phillips, Molybdenum Corp. of America, Grant Bldg., Pittsburgh, Pa. (Pittsburgh Chapter).

L. E. Raymond, Singer Mfg. Co., Bridgeport, Conn. (New Haven Chapter).

C. B. Swander, Wagner Electric Co., St. Louis, Mo. (St. Louis Chapter).

Interesting Exhibit of Open-Hearth Scale Model Accompanies Ontario Talk

Ontario Chapter—The manufacture of basic open-hearth steel was discussed in a non-technical manner in a paper presented by H. M. Griffith of The Steel Co. of Canada, Ltd., at the February meeting.

Mr. Griffith first dealt with the removal of ore from the pit mine. He then covered the manufacture of iron, giving a detailed account of the construction and operation of the blast furnace.

The open-hearth procedure was next fully explained, and the various operations such as charging, tapping, deoxidation, teeming, special effect of additions were presented.

Mold preparation, and the types of molds were discussed, with their influence on the finished product. Stripping of ingots, soaking pit practice, and rolling of steel were also touched upon, as was the final preparation of the billets before rolling on the finishing mills.

The lecture was accompanied by appropriate slides illustrating each point.

A special feature of interest was an accurate scale model of an open-hearth furnace. An interested group gathered about this exhibit after the lecture and Mr. Griffith explained the various details to them.

Rocky Mtn. Officers

Ray McBrian
Chairman

F. R. Anderson
Vice-Chairman

William C. Baum
Secretary

George E. Lundberg
Treasurer

North West Course Continues Tradition

By Charles Nagler

The first educational series of the North West Chapter of the then American Society for Steel Treating was held as far back as 1921.

Speakers for the course included such well-known names as O. E. Harder, H. Kenneth Briggs, R. L. Dowdell, Chester S. Moody, L. H. Berry, W. E. Johnson, Sidney Horsley, John F. Keller, and Francis B. Foley.

In 1940, as in years past, North West Chapter is again conducting a practical non-technical course.

The first meeting of this series was held on Feb. 15 in the hangar of the Northwest Airlines, Inc., Holman Municipal Airport in St. Paul. R. L. Dowdell, professor of metallography, University of Minnesota, discussed magnesium alloys.

At the close of Dr. Dowdell's talk, a Douglas transport plane of the Northwest Airlines was wheeled into the hangar and those present witnessed the inspection of the ship preparatory to flight. The men were also allowed to board the ship and look it over.

The motor rebuilding plant of the Northwest Airlines was then thrown open and the members were shown the propeller assembly, instrument repair and inspection shop.

Show Floor Plans Sent To Former Exhibitors

Floor plans for the 22nd National Metal Exposition to be held in Cleveland's Public Auditorium next October were recently mailed to former exhibitors. Reservations have been coming in at record rate, although spaces will not be definitely assigned until April 6.

After that date the floor plans will be given general distribution among the leading metal producing and fabricating firms in the country.

New Group Is Organized In Colorado

Officers Announced and Program Planned; Headquarters for Group Are in Denver

The latest addition to the family of 50 A.S.M. Chapters is a newly organized group with headquarters in Denver, Colo. Known as the Rocky Mountain Group, it already has 47 members and is growing rapidly.

Several meetings have been held, the latest of which was on March 15. At that time the talking picture "Aluminum, Mine to Metal" was presented by Frank English of Aluminum Co. of America, and Eugene J. Gebben, special agent in charge, Denver district, Federal Bureau of Investigation, gave a coffee talk on "Generalities of Crime Detection".

The night of June 21 has been set aside as National Officers Night and will be followed the next day by an outing at a popular mountain resort.

The officers and executive committee of the new group are as follows:

CHAIRMAN—Ray McBrian, engineer of tests, Denver & Rio Grande Western R.R. Co.

VICE-CHAIRMAN — F. R. Anderson, metallurgist, Gardner-Denver Co.

SECRETARY—Wm. C. Baum, sales representative, Vanadium-Alloys Steel Co.

TREASURER — George E. Lundberg, mechanical engineer, Colorado & Southern R.R. Co.

EXECUTIVE COMMITTEE — Paul A. Archibald, Denver & Rio Grande Western R.R. Co.; C. C. Drake, Griffin Wheel Co.; John E. Holtman, American Manganese Steel Co.; Telfer Norman, Climax Molybdenum Co. (Climax, Colo.); J. Hart Reece, Colorado Fuel & Iron Co. (Pueblo, Colo.); Edward B. Zabriskie, Magnus Metal Div., National Lead Co.; and John Zadra, Colorado Fuel & Iron Co. (Pueblo, Colo.).

Ernst Gives Metal Cutting Talk in Philadelphia

By Joseph Missimer

Philadelphia Chapter—An audience of 425 attended the regular meeting on Jan. 11, to hear Hans Ernst, of the Cincinnati Milling Machine Co., speak on the subject, "Researches in Metal Cutting".

What takes place at the point of the tool? Mr. Ernst answered this question by means of slow motion movies, highly magnified, which certainly enlightened his audience as to the formation of the chip and the processes taking place in its removal.

Mr. Ernst's paper (which has been reported in detail in a previous issue of THE REVIEW) was well received, and the discussion period following the address indicated that the subject matter was one of vital interest.

National Office in New Home

The American Society for Metals is now occupying spacious new quarters at 7301 Euclid Ave., Cleveland, Ohio. All communications should henceforth be sent to this new address.

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OSCAR E. HARDER, *Vice-President*
W. H. EISENMAN, *Secretary*
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RAY T. BAYLESS.....*Editor*
M. R. HYSLOP.....*Managing Editor*

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Power Presses Represent Highest Development of Mass Production — Crane

By A. H. Lewis

Montreal Chapter — Power press products represent probably the highest development of mass production where uniformity of product and equipment is of paramount importance, said E. V. Crane, engineer and consultant, E. W. Bliss Co., speaking on "Plastic Working of Metals and Power Press Operations" at the meeting on Feb. 5.

Following the usual dinner and preceding the lecture, a motion picture "Action Shots of Presses and Can Making" was shown by E. W. Bliss Co.

Mr. Crane introduced his subject via the rolling mill where steel sheets are hot rolled, pickled, cold rolled, annealed, and finished with a skin pass.

Following with the theory of cold working, the speaker showed how the physical properties of metals usually desired for structural purposes are meaningless for cold working calculations, since here all operations are performed at stresses above the yield point. It was shown how the permissible amount of reduction is calculated, and the extent of the plastic working range, that is, the range most favorable for slip plane movement in crystals.

Practical applications of these calculations to the drawing of a shell were shown. In this case the metal of the flange is worked within the plastic range, while the walls of the tube are not stressed above the elastic limit.

The many lantern slides showed the practical applications of deep drawing, blanking, pushbacks, bending brakes, and the use of presses to replace a machining operation, where bosses on rough malleable castings and drop forgings are cold pressed to a tolerance of 0.001 in. at high production speeds.

Developments In Mg Include Electroplating

Winston Gives Much Information on Commercial Alloys

By T. F. Mika

Chicago Chapter—"Commercial Applications of Magnesium Base Alloys" served as a subject for A. W. Winston's lecture at the December meeting. Mr. Winston is director of the metallurgical department of the Dow Chemical Co.

Magnesium metal is obtained from brines found around Michigan containing sodium, calcium, and magnesium chlorides.

They are first treated to remove traces of bromine and evaporated for removal of the sodium chloride. The evaporated solution containing calcium and magnesium chloride is separated by fractional crystallization.

The magnesium chloride is then concentrated, dehydrated, and finally electrolyzed at 1400° F. During the electrolysis the magnesium rises to the surface as a metal 99.9% pure.

Magnesium is usually alloyed with aluminum and zinc. The alloy, better known as "Dowmetal", can be sand cast, die cast, extruded, forged, rolled, drawn, spun, and welded.

In die castings the alloy is used for airplane wheels, vacuum cleaner fans and other parts, valve rocker arm covers, peels for baking ovens, oil sump housings, steering wheels, foot pedals, mine drill housings, etc.

The alloy is extruded and sold as I-beams, channels, seamless tubing, conduits, rods, and bars.

Magnesium alloys may be acetylene, spot, seam, gas, and electric welded. A flux must be used, usually consisting of the chlorides of sodium, potassium, and lithium. The use of a flux is also a necessity in sand casting and in melting the pure magnesium.

The newest development in magnesium alloys is a method of electroplating. Although on a semi-pilot plant scale, information on plating methods is not as yet available.

A radically new method has also been developed for the deep drawing of magnesium alloys, using dies heated to 600 or 700° F.

Although not recommended for continuous contact with water, proper treatment of magnesium alloys makes them resistant to the every-day run of corrosive materials.

14 Past Chairmen Attend Meeting on 20th Anniversary of Boston Chapter Founding

By J. V. Baxter

Boston Chapter—On the 20th anniversary of the founding of the Chapter, celebrated Feb. 2, tribute was paid to the 14 past Chairmen who were present.

Further to delve into the past (shades of Alexander Dumas) D'artagnan appeared in the person of L. R. Dantona (New England fencing champion and member of the Boston Chapter) and his three musketeers, in an exhibition of fencing.

A birthday cake with 20 candles on it accompanied the presentation of certificates to past chairmen by Chairman Knight, while appropriate music was donated by "Sonny" Hayner's orchestra (son of Chapter member Alex Hayner).

Past Chairmen to receive certificates were H. E. Morton, I. H. Cowdrey, Z. L. Sault (deceased), H. E. Handy, V. O. Homerberg, J. M. Darke, F. H. Cole, L. D. Hawkridge, H. B. Parker, R. S. Williams, G. B. Waterhouse, A. D. Bach, E. B. Ashworth, E. L. Bartholomew, F. P. Flagg, W. P. Knecht, J. P. Walsted, H. H. Lester, and E. N. Downing.

Past Chairman A. D. Bach introduced the speaker, Gregory Comstock, associate professor of powder metallurgy, Stevens Institute of Technology, who talked on "Metal Powder Molding".

Mr. Comstock traced the beginning of powder metallurgy in its application to metallic platinum fabrication and development of ductile tungsten for lamp filaments.

Four Principal Metal Powder Products

The four principal commercial products at present being manufactured in quantity from metallic powders are *(a)* the refractory metals tungsten, molybdenum, and tantalum, *(b)* electric contact and electrode materials, *(c)* porous bearings and *(d)* the hard cemented carbides for tools and dies.

Parts made today under the present practices in powder metallurgy demonstrate that particle bonding of two general types is possible. In one type, the adhesion of the particles is developed without melting and closely resembles the intercrystalline bonding of cast materials.

In the other type the bonding is effected by the cementing action of a constituent which is molten at some stage of the consolidating operations.

Iron Powders Molded

Tungsten filaments are an example of the first, and hard cemented carbides of the second type.

At the present time, the commercial metallic powders are chiefly the pure metals. Copper, nickel, cobalt, chromium, aluminum, magnesium, silicon, lead, zinc, iron, tungsten, molybdenum, tantalum, silver, gold, platinum, and indium are available in powder form.

Progress recently made in the commercial molding of iron powders now furnishes the strongest of incentives for further research work in this field. Iron parts can be molded from powders, consolidated by heat treatment, and coined or pressed to an accuracy of fine machining operations.

Bearings, bushings, parts for minor mechanical assemblies, small gears and automobile hardware are now being made with efficiency and accuracy and at a cost comparable to other methods.

Forging Expert Talks On Scope in Industry

By Thomas E. Hamill

Washington Chapter—An authority on forging, Waldemar Naujoks, chief engineer of the Steel Improvement and Forge Co., was the speaker at the January meeting. His subject was "The Scope of Forgings in Industry".

The speaker discussed the early and modern types of forging machines, particularly the board drop and steam drop forging machines, which are capable of handling ingots of 100 lb. to 50 tons.

Particular reference was made to drop forging of 13% Cr and 18-8 stainless steels, naval bronze and intricate aircraft forgings. Most of the latter are made from electric furnace ingots of high purity and are of light weight and high strength.

The various stages in drop forging—edging, fullering, blocking, bending, spreading, and finishing—were illustrated and discussed. All forgings do not pass through all of these stages.

The manufacture of lock type and plain die blocks, the method of first checking their accuracy by means of lead proofs and their common methods of wear were explained. A composition of die block found to be very satisfactory is a Ni-Cr-Mo steel containing about 0.70% C heat treated to a hardness of 60 scleroscope.

Manufacture and Heat Treatment of Steel Castings Seen at Oregon

By B. F. Sawyer

Oregon Chapter—A meeting that was different from any previous meeting of the Chapter was held on Jan. 19 at the plant of the Electric Steel Foundry Co.

The group met at 6:30 and was divided into small parties for a trip through the foundry to see how stainless, manganese, alloy, and carbon steel castings are made.

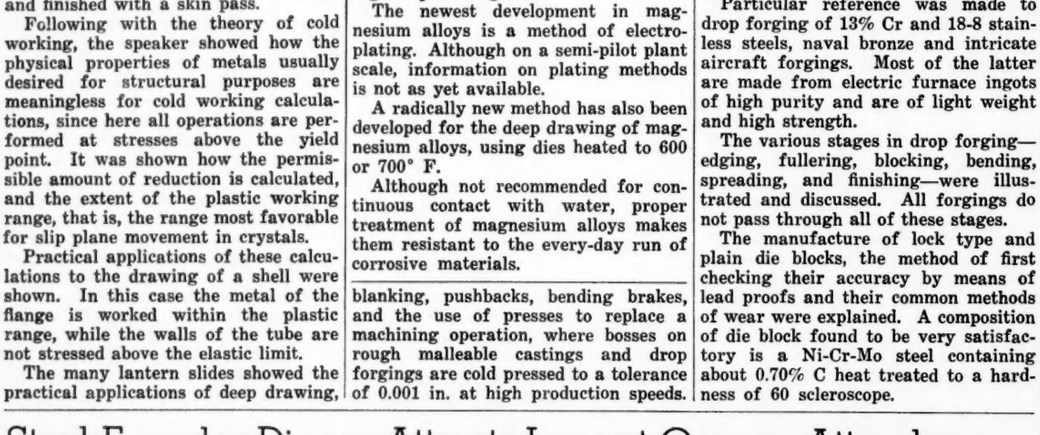
The visit also included an inspection of the new chemical and physical testing laboratories and the X-Ray equipment which the foundry has recently installed.

Two hundred and eight members and guests were present for the dinner, which was served in the drafting room. This represents the largest attendance at a meeting of the Oregon Chapter.

After dinner, Chairman Healy of the Program Committee introduced E. G. Swigert, vice-president of the Electric Steel Foundry Co., who gave an interesting talk on "Steel Foundry Practice".

The group next adjourned temporarily to the heat treating department to watch several tons of manganese steel at 1950° F. being quenched into 50,000 gal. of water. Upon re-assembling in the drafting room, some very fine pictures on "Steel Foundry Products and Procedure" were shown.

Steel Foundry Dinner Attracts Largest Oregon Attendance



Electric Steel Foundry Co. Played Host to 208 Members and Guests of the Oregon Chapter on Jan. 19

Pictorial Story of Gill-Eisenman Tour of Western A.S.M. Chapters

On a Recent Western Trip National President James P. Gill and Secretary W. H. Eisenman Arrived in Los Angeles on Sunday Noon, Feb. 4. An enthusiastic delegation met them at the station: (Left to right) National Trustee Donald S. Clark, Mrs. James H. Knapp and daughter Barbara, Los Angeles Chapter Secretary W. J. Parsons, President Gill, B. H. Brown, Los Angeles Chairman James H. Knapp, G. A. Zellmer, John E. Wilson, C. E. Carlson, and H. J. Langley

During a Stop at Portland on Feb. 12 to Address the Oregon Chapter, Time Was Taken to Inspect Bonneville Dam. Left to right are Chairman Norton L. Peck, Mr. Eisenman, Past Chairman W. J. Ulrich, and Vice-Chairman G. E. Healy

Next Night (Feb. 5) Messrs. Gill and Eisenman Were Guests of Honor at the Los Angeles Chapter Meeting. Between the smiling guests sits the smiling host, Chairman James H. Knapp. Next stop on the trip was at San Francisco, where the President and Secretary appeared before the Golden Gate Chapter Feb. 7

On Feb. 13 the Travelers Arrived in Seattle and Addressed the Puget Sound Chapter. In the photograph are James L. Avis, Frank B. Bolte and A. G. Melde, President Gill, and Chapter Chairman L. T. Holt

Tri-Chapter Meeting To Be in Columbus

By C. H. Lorig

Metallurgists from all sections of Ohio will converge upon Columbus on April 24 for the annual meeting of the Cincinnati-Columbus-Dayton Chapters of the A.S.M.

A luncheon and a full day's technical program have been planned. All sessions will be held at Battelle Memorial Institute.

W. H. Eisenman, secretary of the Society, and other national officers will make their appearance at the luncheon, scheduled for Pomerene Hall on the Ohio State University campus.

Howard Scott, engineer in charge of the metallurgical section, Westinghouse Electric and Mfg. Co., will open the day's technical sessions with a discussion of quenching media and related problems. He received the Robert W. Hunt Award of the A.I.M.E. in 1932, and is past chairman of the Pittsburgh Chapter A.S.M.

J. L. Burns on "Interrupted Quenching", and L. R. Jackson on "Cylinders Bore-Hardened by Induction Heating" are also scheduled for the morning session. Dr. Burns is assistant superintendent of the Wire Division of Republic Steel Corp. Mr. Jackson is metallurgical physicist and assistant supervisor, Battelle Memorial Institute.

The after-luncheon sessions will be devoted to talks by E. E. Legge, American Steel and Wire Co., and E. E. Thum, editor of METAL PROGRESS. Mr. Legge has chosen the timely subject, "Austempering of Steel". Mr. Thum will discuss the question, "Why Do Steels Harden?"

S. L. Hoyt, technical adviser, Battelle Memorial Institute, who is serving as technical chairman of the sessions, stated that ample time will be allowed for discussion from the floor following each talk.

The morning session will be preceded by an inspection of the laboratories of Battelle Memorial Institute.

Interest in Tool Steel and Animal Husbandry Attracts 200 to California Meeting

By John E. Wilson

Los Angeles Chapter—The rumors which reached the Pacific Coast of Messrs. Gill and Eisenman's western trip caused considerable interest and speculation when it was announced that they would appear before the Los Angeles Chapter on Feb. 5. As a result of this, and their interest in animal husbandry or tool steel, about 200 were on hand when Chairman Knapp called the meeting to order.

Mr. Eisenman, true to form, entertained the Chapter with his usual humorous anecdotes, after which he introduced National President James P. Gill.

"Twenty Years of Tool Steel Metallurgy", Mr. Gill's subject, proved to be very interesting for he showed clearly the advancements which have been made in melting, rolling, heat treating practice, furnace design, and chemical composition.

It was announced during the meeting that Edgar C. Bain, of the U. S. Steel Corp., would present a series of four educational lectures, March 19 to 22, on "Functions of the Alloying Elements in Steel".

National Metal Congress & Exposition
Cleveland, Oct. 21 to 25, 1940

Cincinnati Question Experts Miss Only Once in 29 Tries

By J. B. Caine and K. Siems

Cincinnati Chapter—An entirely new kind of meeting conducted on Jan. 25 as one of the educational group nights sponsored by the Chapter met with considerable success.

This meeting was advertised as "Question and Answer Night". The idea was to "stump" four experts, namely G. M. Enos of the Army Ordnance Department, H. S. Binns, chief metallurgist of the Cincinnati Milling Machine Co., H. E. Montgomery and A. J. Smith, metallurgists of the Lunkenheimer Co.

They won with a batting average of .965. Only one of the 29 questions given them in the 2-hr. period "rang the bell" (the President's Bell incidentally).

Book Offered as Prize

Those who attended the meeting were really trying to have one of these four men say "I don't know" to a question, since a choice of one of the books published by the A.S.M. was offered as a prize. (The questioner, by the way, did not have to know the answer to his own question.)

The winner of the prize was Wilson Kinsey of the Universal Cyclops Steel Co. who asked: "How do you bright pickle stainless steel so that it does not have to be polished afterward?"

Here are some of the questions that were answered; perhaps members of other Chapters would like to see what they can do with them:

What is the ratio between the right and left scales when a laue pattern is transferred from the X-ray film to paper?

What is graphitic carbon?

In flame hardening, why can oil hardening steels be water quenched without cracking?

Explain the action of nitrogen in high chromium steel.

When a steel is spheroidized, is there a limiting size to the spheroid? If so, why?

Why does an annealed low carbon sheet sometimes show a lower Rockwell hardness after cold reduction?

What is the effect of vanadium on the grain size and intergranular corrosion of stainless steel?"

Peoria Quality Control Series Starts Last Half

By P. E. Nixon

Peoria Chapter began the last half of a series of illustrated talks on "Quality Control" on Monday, March 4.

Speaker at the first meeting was F. B. Smith of Western Electric Co Chicago. The following Monday P. C. Cunnick, associate engineer of the Rock Island Arsenal, spoke on "Inspection and Quality Control". On March 18, F. C. Parks, vice-president, Parks Air College, East St. Louis, Ill., spoke on "Selecting Men of Mettle for Aviation".

At the next meeting to be held on April 8th the principal speaker will be F. G. Anderson, metallurgist, National Lock Co., Rockford, Ill. His subject will be "Quality Control of the Manufacture of Automotive and Aircraft Bolts and Nuts".

The final lecture of this series will be held on May 13, when E. P. Kerruish, chief inspector, Cleveland Graphite Bronze Co., will talk on "Quality Control Obtained by Modern Inspection Equipment".

Physicist Contributes To Understanding of Behavior of Metals

By Walter G. Patton

Detroit Chapter—Of the 24 men who have served as Chapter chairmen since 1914, 16 were present at Past Chairmen's Night Feb. 12 to receive certificates presented by Bill Woodside, former president of A.S.M.

Included in the group were H. J. Lawson, first chairman, C. N. Dawe, W. J. Learmonth, J. L. McCloud, W. G. Calkins, J. M. Watson, E. J. Hergenroether, F. P. Zimmerli, J. G. Gagnon, J. W. Robinson, C. J. Tobin, G. A Webb, E. G. Brick, G. Coley, W. P. Eddy, Jr., and A. L. Boegehold.

The speaker of the evening was Dr. Saul Dushman, physicist of General Electric Co. Although Dr. Dushman's approach to his subject, "Application of Modern Physics to Metallurgical Problems," was necessarily highly technical, it is a tribute to his mastery of the subject and an extraordinary sense of humor that the interest of his audience never lagged.

At the outset, Dr. Dushman said quite frankly that in the eyes of a physicist, "metallurgy is a terrible mess". But this fact, he observed, should not deter one from recognizing that the physicist has contributed important tools in the advancement of the science of metallurgy, including the microscope, various elaborate measuring devices and the X-ray.

Today, he pointed out, the physicist is making a most significant contribution to an understanding of the behavior of metals by developing a new point of view based on the measured behavior of atoms and electrons.

That the physicist actually can, within limits, translate his theories into practice was illustrated by Dr. Dushman when he offered a comparison of measured latent heats of evaporation of pure metals and the same heats calculated from the structure of the individual atoms.

According to the speaker, the growing intensity of the technical demands on the metallurgist to produce materials that will withstand higher temperatures and pressures makes the atomic approach to the problems of metallurgy a logical one.

The cohesion of metals, he added, can be explained on an energy basis since there is a balance between attractive and repulsive atomic forces. Dr. Dushman amplified this point by presenting several curves showing the net binding energy of selected pure metals.

As a matter of fact, consideration of atomic behavior and energy relations leads to an explanation for many properties of metallic substances. To elaborate on this contention, Dr. Dushman showed a table which included calculated vs. actual values for such well-known physical properties as latent heat of evaporation, compressibility, melting point, and Young's modulus.

To many of his listeners, it must have come as a surprise that already the physicist's theoretical calculations have brought him reasonably close to predicting some actual property values for metallic materials.

While Dr. Dushman did not say it in so many words, his listeners were undoubtedly impressed by the promise for practical applications which the physicist's theories offer to the metallurgist.

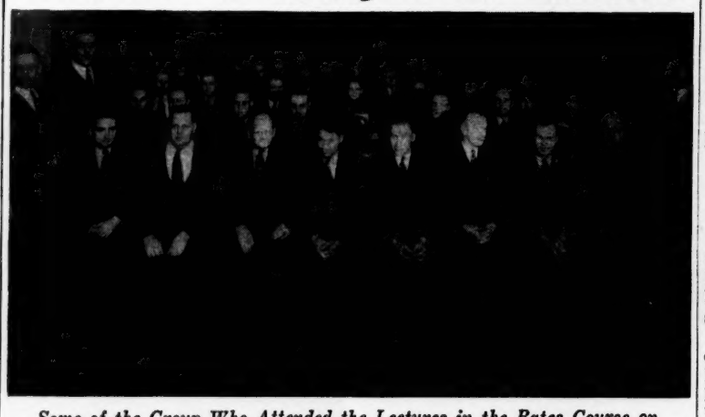
Welding Awards Described

A 48-page brochure describing the "$200,000 Industrial Progress Award Program" of the James F. Lincoln Arc Welding Foundation has just been published.

The brochure announces the purpose of this 2½-year program offering 458 awards, indicates its wide scope, and lists the 12 classifications and 46 divisions for participation.

Copies may be obtained gratis by all individuals interested in participation in the program by addressing The Secretary, The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio.

Rockford Course Judged Most Successful



Some of the Group Who Attended the Lectures in the Bates Course on Fundamentals of Ferrous Metallurgy Presented by the Rockford Chapter

By L. J. Strohmeyer

Rockford Chapter has just completed its most successful educational course. Meetings were held every Thursday for eight weeks.

The original enrollment was 65, but this increased to 83 before the course was finished. Four new members have joined as a result of the course.

The course used was "Fundamentals of Ferrous Metallurgy" prepared by A. A. Bates. It was conducted by C. R. Wiggins of Northwestern Steel & Wire Co., Sterling, Ill.

Detailed Program of Penn State Meeting In May Announced

Complete details of the program for the Fourth Biennial Inter-Chapter Meeting, to be held at State College, Pa., May 3 and 4, have been announced.

The participating Chapters are Philadelphia, Pittsburgh, Lehigh Valley, York, Southern Tier, and Penn State. Members of other Chapters are also cordially invited.

It is urgent that hotel accommodations be reserved immediately, since they are somewhat limited. Hotels in State College are the Nittany Lion Inn, State College Hotel, and Penn State Hotel. At Bellefonte, Pa., 15 miles away, good accommodations are available at the Penn Belle, Markland and Brockerhoff.

The program for the meeting follows:

FRIDAY, MAY 3, 2:00 P.M.

Session on High Temperature Alloys

CO-CHAIRMEN: H. J. French and F. B. Foley

Evaluation of Steels for High Temperature Service, by C. L. Clark, Univ. of Mich.

Commercial Aspects of High Temperature Alloys, by J. J. Kanter, Crane Co.

DISCUSSION LEADERS: V. N. Krivobok and N. L. Mochel

6:00 p.m.—Informal Dinner at Nittany Lion Inn; Address by Walter Matheslus

8:00 p.m.—Smoker and Entertainment

SATURDAY, May 4, 9:00 A.M.

Session on Hardenability of Steel

CO-CHAIRMEN: E. C. Bain and C. H. Herty

Hardenability and Quenching, by M. A. Grossmann, Carnegie-Illinois Steel Corp.

Commercial Aspects of Hardenability Tests, by W. E. Jominy, General Motors Corp.

DISCUSSION LEADERS: G. V. Luerssen and Howard Scott

Visits to the laboratories and exhibits in the Mineral Industries Bldg. and to the Titan Metal Mfg. Co. at Bellefonte are also scheduled, and golf arrangements have been made for Saturday afternoon.

LADIES' PROGRAM

Friday, May 3, 3:30 p.m.

Tea at Nittany Lion Inn

6:00 p.m.—Informal Dinner

Saturday, May 4, 9:00 a.m.

Coffee Hour in the Library, Mineral Industries Building.

10:00 a.m.—Lecture on "Ceramics in the Home" by N. W. Taylor; Visit to Mineral Industries Museums.

Inspection of Lab Precedes Plastics Talk

Plastics Defined, History and Manufacturing Processes Comprehensively Covered

By G. G. Wilcox

Hartford Chapter—Meeting in the research laboratory of Underwood Elliott Fisher Co. on Feb. 13, the members were given an opportunity to inspect the interesting equipment.

The subject of the meeting was "Modern Plastics", well presented by Charles F. Benner, metallurgist of General Electric Co. Plastics Department at Pittsfield, Mass.

"Plastics" is a synthetic material which at some stage of its manufacture from a raw material to the finished product is in a plastic or viscous state.

Looking backward briefly, the first synthetic plastic was cellulose nitrate, developed in 1869 as a substitute for ivory in billiard balls. The phenolic plastics were announced in 1909, and since then have come urea-formaldehyde resins, cellulose acetate, and numerous other compounds.

Several processes are used in making plastics, namely, hot molding, injection molding, cold molding, extruding, laminating, casting and rolling.

Two Classes of Molded Plastics

The molded plastics are divided into two classes—thermosetting and thermoplastic. In the former, the plastic material is compressed in a heated mold and undergoes a fundamental chemical change which renders it permanently infusible and insoluble.

Thermoplastic materials may, on the contrary, be remelted since no chemical change takes place on molding. Thermoplastics have no sharp melting point, but become increasingly softer as the temperature is raised.

Exposure to elevated temperatures of the thermosetting plastics tends to complete the cure with an increase in hardness. Hot molding is done at 130 to 190° C. with pressure from 2000 to 12,000 psi. of projected area of molded part.

The phenolic plastics are of the thermosetting group and have the widest use of all plastics. They are limited to the darker shades of the colors and to black and brown.

Selecting Steel for Molds

The molds must be well designed and built of suitable steel having a hard, abrasion resistant surface, a tough and resilient core, and good machinability.

The G.E. Plastics Department finds that S.A.E. 3312 and S.A.E. 3110 serve this purpose well.

The two most common methods of producing metal mold cavities are machining and hobbing. The plungers are always machined.

The urea-formaldehyde resins, also of the thermosetting group, were developed in an attempt to secure lighter colors. These plastics are now made in an almost limitless variety of colors.

Their chief advantage over the phenolics is that they may be made either translucent or opaque. Their resistance to acids, alkalies, alcohol, greases and oils is good.

Mr. Benner concluded his lecture by saying that the field of modern plastics is developing so rapidly that no one can foresee its course in the near future, nor predict the nature and properties of the plastics of tomorrow.

The Chapter thoroughly appreciates the courtesy of the Underwood Elliott Fisher Co. in providing the facilities for this very interesting meeting.

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Six Sages Occupy the Bench and "Information Pleases"

Highly Impressive Was the Setting Prepared for the Six Able Metallurgists Identified Above Who Acted as Sources of Information. At the extreme right is H. W. Highriter, chief inquisitor, moderator and gong ringer

New Jersey Learns and Laughs At 'Stump the Experts' Meeting

By Fred P. Peters

New Jersey Chapter—With question-asking rivaling horseshoe-pitching as the great American pastime, the announcement that the February meeting of this Chapter would be a quiz session brought delight to the hearts of all the members—except the learned gentlemen who were to function as "experts". For it was to be a "stump-the-experts" sitting, and six of New Jersey's finest had agreed to pit their wits against the collective interrogation of their fellow members.

But the experts weren't stumped—that is, not often—and the night was completely instructive and entertaining; even for the brave group of "chief metallurgists" who had so unselfishly offered their high-powered reputations upon the altar of metal knowledge.

The six sages were:

R. J. Allen, Worthington Pump & Machinery Co., Harrison

B. Clements, Wright Aeronautical Corp., Paterson

H. L. Day, Ingersoll-Rand Co., Phillipsburg

A. A. Hassan, Crucible Steel Co. of America, Harrison

N. E. Woldman, Bendix Aviation Corp., Bendix

J. F. Wyzalek, Hyatt Bearings Div., General Motors Corp., Harrison

H. W. Highriter, Westinghouse Lamp Co., Bloomfield, who shares with the Program Committee the credit for planning the meeting, acted as chief inquisitor, moderator and gong-ringer.

For the first half of the meeting, Mr. Highriter asked the perspiring pundits a series of 20 questions submitted in writing by the members during the month before the meeting. Most of these were serious queries, the answers to which were either sorely needed by the questioners or were deemed to be of general educational value.

Questions Are Varied

The questions ranged from simple inquiries as to the actual existence of such alleged conditions as "crystallization" in metal fractured by repeated stressing, to requests for information on the cause of "flakes" in steel or on best methods for hardening and straightening long, thin mandrels. The answers to all these were complete and instructive, the savants having strived to make the answers to *these* questions as informative as possible.

But there were *other* questions, 25 in all, which the members submitted during the meeting for the expressed purpose of "stumping" the worried wiseacres in the latter half of the program—with a reward of $1.00 per stump.

The experts were supposed to collect $1.00 each for every question successfully answered, but chose instead to consign their winnings to the "Finnish Relief Fund" (suspected by some scandal-mongers to be a completely hypothetical organization). To the everlasting renown of these gentlemen, be it recorded that only $5.00 missed consignment to this fund!

Finnish Relief Collects

In fact, their erudition was as amazing, sometimes, as that of Clifton Fadiman's board of experts of radio fame. Mr. Wyzalek, for example, had no trouble whatever in recalling that bauxite and not termite was the commercial source of aluminum, while Mr. Day, under considerable pressure, correctly denied the presence of copper in copperas, of silver in German silver, and of lead in lead pencils, and admitted the presence of tin in tin cans—a feat that brought cheers from the audience and $1.00 for General Mannerheim.

Unfortunately, the courageous Finns will just have to do without the dollar that would have been theirs if one of the experts had only known the significance of J. P. Gill's middle initial—"Paul" just wasn't right. (Mr. Gill may have somewhat the same feeling about "Presley"!)

A few salient facts:

All the experts were members of this Chapter except Mr. Day, who was borrowed from Lehigh Valley.

In spite of a drenching rain, 170 members and guests attended, asked questions, cheered, jeered, and, of course, beered—as usual.

The Program Committee and Mr. Highriter had been somewhat worried lest the program—an experiment for this Chapter—fail to be both instructive and entertaining, as planned. That their fears were without foundation was demonstrated by the spirited participation of the audience.

Grossmann Is Properly Greeted by Hotel Radio

By J. B. Caine and K. Siems

Cincinnati Chapter—Concrete evidence of the alertness of the Chapter's Publicity Committee was brought strongly to the attention of Marcus A. Grossmann of Carnegie-Illinois Steel Corp. shortly after he arrived in Cincinnati on Feb. 15.

Registering at the Netherlands Plaza Hotel, he tuned in the radio in his room, and the very first words which greeted him over the air were:

"The Cincinnati Chapter of the American Society for Metals will hold its regular monthly dinner meeting at the Alms Hotel tonight and will be addressed by Dr. M. A. Grossmann on the subject of "Hardenability".

The Publicity Committee, of course, did not plan that Dr. Grossmann should tune in at that particular moment, but they have arranged with the management of the Alms Hotel, headquarters for the Cincinnati Chapter, that the Society programs be announced one to three times a week on a program entitled "Today at the Alms".

One of the largest crowds of the season waded through the deepest snow in years to hear Dr. Grossmann's address that evening. Most of the points made by Dr. Grossmann in his talk have been covered in previous reports.

Welding Trend Is Toward Larger and Heavier Assemblies

By A. Floyd Whalen

York Chapter—Everett Chapman has acquired so many friends and become so popular that he rates as a four-star attraction; hence standing room only was available for his January appearance at York, even though the thermometer registered only 8° above 0.

With his droll wit and keen analysis he brought his message on fusion welding right up to date. Many left his lecture parodying: "When bigger and better things are to be welded, better see Chapman at Coatesville."

His homely sketches carried a humorous vein and the laughs help to drive home the scientific truths at a glance better than an hour of scientific formulas could.

His photoelastic studies of strains and stresses made from plastic materials are second to none, and his micro studies of parent and laid-on metal are educational gems.

Large Dredge Pump Welded

The trend in fusion welding seems to be to create ever larger and heavier assemblies. One prominent example that might be quoted is a dredge pump being used in the Potomac River. This dredge is capable of removing 500-lb. boulders from the bottom of the river, and the pump is a 100,000-lb. assembly which sucks these boulders up and deposits them at the disposal grounds.

The dredge was at least 8 ft. high and the mouth of the pump large enough for a beautiful girl model to sit comfortably in it on a chair—all members of this assembly were fusion welded.

We all felt our atomic proportions when Mr. Chapman brought up a problem once submitted to Lukenweld wherein the engineer had designed a housing for a diesel engine. After laying it out Chapman says he figured the customer had asked him to design a fishing rod 18 miles long to hold a 1-lb. weight on the end!

This problem was solved by making a small model and strengthening one part and weakening the other until the two parts became workable.

Requirements Of Crankshafts Are Outlined

High Engine Speed Complicates Manufacturer's Problems, Says Wyman-Gordon Works Mgr.

By M. H. Kalina

North West Chapter—During the last ten years the high speed of the modern engine has complicated the crankshaft manufacturer's problems considerably, said Harold F. Wood, works manager of Wyman-Gordon Co., Harvey, Ill., speaking at the February meeting on "Drop Forged Crankshafts".

These problems center around the economical manufacture of balanced shafts.

The chief requirements of shafts are: *(a)* Lack of defects, *(b)* uniform structure, *(c)* uniform elasticity, *(d)* resistance to wear, *(e)* resistance to fatigue.

Most steel used in the manufacture of ordinary car, truck and tractor shafts is of the S.A.E. 1045 type with 0.7 to 0.9% Mn and 0.15 to 0.20% Cr. All crankshaft steels should have a fine grain by the McQuaid-Ehn test.

For diesel crankshafts a 0.45 to 0.55% C and 0.90 to 1.05% Mn steel with 0.15 to 0.20% Cr for deep hardening is used. This type of steel commands a $5 per ton premium.

Aircraft Uses Alloy Steels

Little alloy steel is used in crankshaft manufacture. The chief exception is the aircraft industry where X4340 and 2512 steels are often used.

The automotive and tractor industries use shafts made of open-hearth steel, while aircraft demands the more uniform electric furnace steel.

The equipment for crankshaft forging consists of pusher type furnaces, drop forge hammers, tong presses, trimming presses, flange upsetting machines and twisting machines. The twisting machines are used on shafts with throws in two or more planes.

Billets of a uniform size are soaked at 2250 to 2300° F. for low carbon steel and at 2150 to 2200° F. for alloy steel. After soaking the billet is broken down to the desired shape by forging into a series of dies. The alloy steels usually require more than one reheating during this break-down period.

Next the flash is removed, the flanges upset and the throws bent if required.

Heat treatment of crankshafts consists of normalizing at 1650° F., hardening at 1550° F. by water quenching, and tempering at 1050 to 1175° F. The furnaces used for these operations are continuous and automatic.

Distortion Controlled

Most of the distortion of the shaft is controlled by bending them in a direction opposite and equal to the average warping of a straight shaft by heat treatment. This bending is done before quenching when the shaft is still soft, and thus a minimum of stress is set up.

One of the chief developments in the mass production of crankshafts is the rapid method of centering. This consists essentially of balancing the shaft in a dynamic machine.

This machine is arranged so that the center of rotation of the ends of the shaft can be individually changed while the shaft revolves, and thus the shaft can be exactly balanced or put off balance any specific amount. Once it is satisfactorily set, centering holes are drilled in each end.

The final tests of the shafts consist of correct longitudinal and radial spacings as well as hardness tests.

Helpful Literature — Mail Coupon Below

Moisture Determination
A very colorful leaflet by the Harry W. Dietert Co. describes new, rapid methods of determining moisture content by drying. Illustrated. Bulletin Cd-198.

Air-Gas Proportioning
Proportional mixers for accurate Air-Gas proportioning are described in a catalog made available by the Eclipse Fuel Engineering Co. Bulletin Cd-226.

Metallographic Equipment
The large and complete line of equipment for the laboratory made by the Fisher Scientific Co. is described in a clever leaflet just released. Bulletin Cd-182.

Brazing
Economical brazing through the use of EASY-FLO is explained in a booklet released by Handy and Harman. Bulletin Cd-126.

Houghton Products
An attractive booklet summarizing the leading products which E. F. Houghton & Co. is supplying in volume to the metal industries of the world is now available. Bulletin Cd-38.

Combustion Safeguard
The Flame-otrol, a combustion safety device designed to shut off fuel and prevent explosions in case of flame failure, is described in a 12-page booklet by Wheelco Instruments Co. Bulletin Cd-110.

Free Machining Steels
Speed Case and Speed Treat, two steels with increased machining properties, are described in literature available through Monarch Steel Co. Bulletin Cd-255.

Metal Blackout
The new JETAL process for blackening iron and steel quickly and thoroughly at low cost is described in literature available through the Alrose Chemical Co. Bulletin Cd-256.

Electric Salt Bath Furnaces
Users' reports on work treated in the Ajax-Hultgren salt bath furnace are described and operating data for cyaniding, carburizing, hardening high speed steel, etc., are given in literature of Ajax Electric Co., Inc. Bulletin Cd-43.

Insulating Firebrick
Just off the press—a new booklet gives engineering data on B & W K-16 Insulating Firebrick as manufactured by The Babcock & Wilcox Co. Bulletin Cd-75.

Correct Furnace Atmosphere
Furnace atmosphere can now be measured precisely by the improved ANALY-GRAPH which is described in a new booklet by The Brown Instrument Co. Bulletin Cd-3.

Heat-Corrosion Resisting
A handsome new 56-page book on electrical heat and corrosion resisting alloys containing general information and useful data about such alloys has just been published by the Driver-Harris Co. Bulletin Cd-19.

High Speed Steels
Seven grades of high speed steels are thoroughly described in an interesting folder released by Crucible Steel Co. of America. Bulletin Dc-56.

Fabricating Stainless
Fabricating Republic ENDURO Stainless Steels and other stainless steels is made easier in a booklet just issued by the Republic Steel Corp. Bulletin Hc-8.

General Data Book
Valuable reference and data are contained in a book by Joseph T. Ryerson & Son, Inc., which gives metallurgical definitions, heat, hardness, and numerical equivalent tables as well as many valuable operating facts. Bulletin Nc-106.

Design
Designing greater sales appeal into products is explained in a colorful 8-page booklet for anyone who contemplates using, or is using Stainless Steel, issued by the Carpenter Steel Co. Bulletin Nc-12.

Portable Potentiometer
An extremely versatile indicating potentiometer with precise balancing, quick standardization, and easy-reading scales is described and illustrated in a new folder by the Roxboro Co. Bulletin Nc-21.

Heat Treat Chart
Heat treaters everywhere should find a heat treating wall chart complete with S.A.E. specifications a very valuable addition to their shops. Published by Chicago Flexible Shaft Co., manufacturers of Stuart industrial furnaces. Bulletin Ka-49.

Electrotinning
E. I. du Pont de Nemours & Co.'s manual on the sodium stannate-acetate electrotinning process is particularly timely. Electrodeposition, at first considered useful only for tin coating of recessed and irregularly shaped objects, is now being considered favorably for all types of work. Bulletin Ox-29.

Refinery Specialties
Refinery tube supports and other specialties made of Ohio Steel Foundry Co.'s "Fahrite" heat and corrosion resisting alloys are the subject of a well-illustrated loose-leaf booklet. Bulletin Ka-40.

Metal Heating
Improvements in furnace economies, operating conditions and appearance, furnaces that will more satisfactorily meet old requirements or handle new processes, service that will help solve the most stubborn problems are offered and described by Mahr Mfg. Co. in Bulletin Ea-5.

Carburizer
Modern is the furnace and modern is the catalog which describes it. Hevi Duty Electric Co. has an exceptionally well-written, well-illustrated, and artistically printed booklet on the Hevi Duty carburizer which uses the Carbonol process. Bulletin La-44.

Microscope Accessories
A 62-page catalog with index and price list describes and illustrates all sorts of microscope accessories, including a wide variety of objectives and eye pieces, made by Bausch & Lomb Co. Bulletin Sx-35.

Continuous Heat Treating
Literature on their No. 29-F Heating Machine is now available through the American Gas Furnace Co. Shows picture of machine and gives operating data. Bulletin Bc-11.

Scale-Free Hardening
Complete information on equipment to assure precise heat treatment, eliminate scale, reduce costs, and improve working conditions is contained in a publication by General Electric Co. on conveyor-type electric furnaces for use with protective atmosphere for scale-free hardening. Bulletin Bb-60.

Bessemer Steel
Jones & Laughlin Steel Corp. has for distribution reprints of the paper by C. C. Henning on "Manufacture and Properties of Bessemer Steel" that received the Robert W. Hunt Award of the A.I.M.E. Bulletin Ca-50.

Globar Elements
Globar Pin Type Non-Metallic Electric Heating Elements and Terminal Rods and Globar "AT" Type Non-Metallic Electric Heating Elements are explained and illustrated in two booklets issued by the Globar Division of the Carborundum Company. Bulletin Lb-25.

Furnace Experience
Facts developed through 32 years of engineering and building practically every type of industrial fuel equipment can be obtained through Flinn & Dreffein Co. Bulletin Bc-82.

Optical Pyro
No correction charts, accessories, nor upkeep are required with the Pyro optical pyrometer, which is a totally self-contained direct-reading precision instrument made by Pyrometer Instrument Co., and described in Bulletin Ay-37.

Forging Presses
Solid Frame Forging Presses having greater production possibilities are described in a new bulletin issued by the Ajax Manufacturing Company. Points out the wide variety of forgings capable of production on this type press. Bulletin Kb-105.

Colmonoy
The high resistance to wear and corrosion which distinguishes Colmonoy alloys and overlay metals is explained in a 4-page catalog released by Wall-Colmonoy Corp. Bulletin Bc-85.

Pickling Savings
Savings in the pickling department when Monel is used are shown in an illustrated folder just released by the International Nickel Co. Bulletin Ad-45.

Low-Alloy Steel
A new folder on Mayari R, Bethlehem's high-strength, corrosion resisting steel, is colorfully illustrated with views of its various uses. Bulletin Kc-76.

Dust Collecting
Fourteen outstanding features found in Pangborn dust collectors, along with pictures of typical installations and savings, are found in the new Pangborn Bulletin. Bulletin Ad-68.

Flame Hardening
The rapid development in recent years of the process of hardening with the oxy-acetylene flame well warrants the publication of this handsomely printed booklet which contains a multitude of excellent photographs of the applications of the process and of the equipment. Air Reduction Sales Co. Bulletin Ga-69.

Vapocarb-Hump
Vapocarb-Hump, the triple-control method for heat treatment of steel, is described in a 36-page catalog issued by Leeds & Northrup Co., in which a special effort has been made to show how this method gives complete control of tool surface, shape and structure. Bulletin Cb-46.

Machining Data
A new chart giving the correct grade of Kennametal for machining 21 types of metals, with recommended cutting speeds, has just been made available by McKenna Metals Co. Bulletin Lc-238.

Low Cost Cleaner
A low cost speed-cleaning machine for plants having a rather limited production of small products is introduced in a folder by the American Foundry Equipment Co. Bulletin Ad-112.

Vanadium Steel
Latrobe Electrite Vanadium High Speed Tool Steel is described in literature released by the Latrobe Electric Steel Co. Bulletin Kb-208.

Welding Stainless Steels
A 24-page technical bulletin, giving important information for the engineer, designer or welding operator on the welding of stainless steel, is available through the Arcos Corp. Bulletin Hc-191.

Park-Kase
A leaflet by Park Chemical Co. contains complete information concerning a new liquid carburizer of rapid and uniform penetration. Unique features and advantages of the bath are backed up with technical data. Bulletin Na-141.

Thermocouple Insulators
An exceedingly complete stock of thermocouple insulators is described in a bulletin made available by the Claud S. Gordon Co. Bulletin Hc-53.

Tempering
Vertical batch type tempering furnaces are described in a folder by Industrial Heating Equipment Co. Capacity and production figures and a diagram of the furnace are included along with a complete description. Bulletin Ia-168.

Multi-Point Pyrometer
The Alnor Rectangular Type Pyrometer, designed to provide a rugged moderately priced instrument with multi-point switch, is described in a release by the Illinois Testing Laboratories, Inc. Bulletin Dc-180.

Testing Machines
A compact spiral-bound 58-page booklet on the extensive Olsen line of testing machines and instruments has just bee released by the Tinius Olsen Testing Machine Co. Well illustrated and filled with informative charts and testing data. Bulletin Gb-147.

Pot Furnaces
Cylindrical type Pot Furnaces for Lead, Salt, and Cyanide baths are illustrated and described in a leaflet issued by the American Electric Furnace Company. These furnaces are adapted for practically any heat treating operations using a liquid medium. Bulletin Kb-2.

Hydrogen Brazing
A new "Electroblast" hydrogen brazing furnace designed for the inexpensive, clean brazing of carbide-tipped tools is described in a folder by Stark Tool Co. A full description of the method of brazing and precautions necessary is included. Bulletin Ab-186.

Mounted Wheel Chart
A convenient ready reference wall chart showing mounted grinding wheels should be of great advantage in the cleaning room, pattern shop, tool and die room, and many other places. It gives at a glance, by means of detailed drawings, actual size, the exact radius of each wheel and its exact shape. Chicago Wheel & Mfg. Co. Bulletin Bd-230.

Hardening Furnace
A new pamphlet which describes "Certain Curtain" furnaces made by C. I. Hayes, Inc., will be particularly interesting to those with hardening problems. Bulletin Nc-15.

Non-Sparking Safety Tools
If your work is near inflammable gases, explosives, etc., the new 20-page catalog featuring Ampco non-sparking safety tools will prove interesting and valuable. Ampco Metal, Inc. Bulletin Bd-175.

Dilatometer
The new Rockwell-Bristol Dilatometer which both indicates and records in ink time-dilatation changes and temperature-dilatation changes simultaneously during heating and cooling cycles is described in a folder released by the Bristol Co. Bulletin Bd-87.

Heat Resisting Alloys
Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

Oil Burners
North American Mfg. Co. offers a bulletin describing improved low pressure oil burners, one type especially designed for automatic control and ideally suited for use with proportioning control valves. Bulletin Na-138.

Foundry Sand
A pamphlet recently issued on TAM Foundry Zircon Sand and TAM Zircon Flour contains detailed informaiton on these products of the Titanium Alloy Mfg. Co. Bulletin Hc-90.

Metallographic Reference
Nearly one thousand technical books and reference papers on Optical Principles in Metallography are listed in the new Metal Analyst just released by Adolph I. Buehler. Bulletin Lc-135.

Tocco Process
The marvel of all heat treaters—the Tocco Process of Induction Hardening—is fully described in a colorful folder by the Ohio Crankshaft Co. Bulletin Lc-145.

Contour Sawing
A virtual text on Contour Sawing, containing over 300 illustrations in its 160 pages, is now available through Continental Machines, Inc. Bulletin Bd-170.

Structural Metal
A complete and concise discussion of magnesium and its alloys is contained in the booklet "Industry's Lightest Structural Metal" which is made available through the Dow Chemical Co. Bulletin Bd-215.

Heat Treating Hints
A helpful, colorful booklet edited by experienced heat treaters is available through the Lindberg Engineering Co. Bulletin Bd-66.

Flame Gouging
An economical method of growing steel, "Flame Gouging", is explained with operating data and illustrations in an 8-page folder released by The Linde Air Products Co. Bulletin Bd-63.

Machinability Chart
A quick and accurate picture of how Rustless stainless steel will respond to your shop operations, is given in the "slide-rule" machinability chart available through the Rustless Iron & Steel Corp. Bulletin Bd-169.

High Temperature Fans
A 4-page illustrated bulletin on this subject has been released by Michiana Products Corp. The applications (where temperature requirements range up to 1800° F.) are enumerated and construction described. Stock sizes mentioned include fans up to 32,000 cubic feet per minute capacity. Bulletin Hb-81.

Moly In Steel
Metallurgists, engineers and production executives who are really interested in the metallurgy of steels and their application will want the excellent book on molybdenum steels published by Climax Molybdenum Company. Bound in loose-leaf manner, this reference book is chock-full of tables which form a volume almost an inch thick. Bulletin Hb-4.

Vacuum Cleaning
A very colorful brochure which illustrates modern cleaning methods by vacuum in industrial plants has been released by The Spencer Turbine Co. Bulletin Dc-70.

Specialized Tester
The Rockwell superficial hardness tester is a specialized instrument for use where the indentation into the work must be kept shallow or of small area, yet sensitivity preserved. A supplement to Wilson Mechanical Instrument Co.'s catalog on the regular Rockwell tester tells all about it. Bulletin Sy-22.

Ferro-Alloys
An interesting folder by Electro Metallurgical Co. tells all about their ferro-alloys and their special service to users which will help them to operate their furnaces and make alloy additions under the proper conditions. Bulletin Jy-16.

Char-Mo Atmosphere
A colorful folder explaining how molybdenum steel can be heat treated without decarburization is now available through the Surface Combustion Corporation. Points out advantages of the new Char-Mo furnace and explains its operation. Bulletin Lb-51.

Fatigue Test
A complete description of the fatigue test as made on the R. R. Moore fatigue testing machine is given in a folder by Baldwin-Southwark Corp. Examples are discussed and illustrated. Bulletin Ka-67.

Cr-Ni-Mo Steels
A. Finkl & Sons' catalog is really a technical treatise on chromium-nickel-molybdenum steels for forgings. Pocket size, 104 pages, cloth bound, illustrated by photographs, charts and tables. Bulletin La-23.

Laboratory Furnace
The Sentry Co. describes a high temperature tube combustion furnace. It permits operating temperatures up to 2500° F., thus offering greater speed and precision for combustion analysis or other laboratory procedures. Bulletin My-114.

High Speed Steel
Required hardness and extraordinary toughness combine to make Firth-Sterling Co. new high speed steel "Mo-Chip" of unusual interest to manufacturers who need a steel that is "practically indestructible." Bulletin Ad-177.

Screw Machining
Screw machine products of aluminum are treated in authoritative and extensive manner in a booklet of Aluminum Co. of America. Besides general data on screw machining, a number of very useful tables appear. Bulletin Ar-54.

Ingot Production
"The Ingot Phase of Steel Production" is the title of a book defining the principles of quality ingot production followed by many well-known steel manufacturers. Gathmann Engineering Co. Bulletin Ka-13.

Seamless Tubes
Prepared by the Timken Steel and Tube Division of Timken Roller Bearing Co. is a "Guide for Users of High Temperature Steels" which presents technical data relating to the various properties of Timken seamless tubes. Bulletin Bb-71.

Ni-Cr Castings
Compositions, properties, and uses of the high nickel-chromium castings made by The Electro Alloys Co. for heat, corrosion and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

Annual Index
The Annual Index of the Copper Alloy Bulletin published regularly by the Bridgeport Brass Company is now made available through this company. Bulletin Kc-163.

High Tensile
The 19 advantages that USS Cor-Ten steel offers to railroads and other industries are attractively presented in a 68-page book on this new low cost, high tensile steel published by United States Steel Corp. Bulletin Ka-79.

Lubrication
Intensive research which completed important improvements in the field of heavy-duty gear and bearing lubrication is tabulated in a new 12-page illustrated bulletin just released by D. A. Stuart Oil Co., Ltd. Bulletin Lb-118.

The Review
7301 Euclid Ave., Cleveland

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Cd-126	Dc-56	La-44	Kb-105	Ad-112	Nc-15	Bd-63	Ad-177
Cd-38	Hc-8	Sx-35	Bc-85	Kb-208	Bd-175	Bd-169	Ar-54
Cd-110	Nc-106	Bc-11	Ad-45	Hc-191	Bd-87	Hb-81	Ka-13
Cd-255	Nc-12	Bb-60	Kc-76	Na-141	D-17	Hb-4	Bb-71
Cd-256	Nc-21	Ca-50	Ad-68	Hc-53	Na-138	De-70	Fx-32
Cd-43	Ka-49			Ia-168	Hc-90	Sy-22	Kc-163
				Dc-180	Lc-135	Jy-16	Ka-79
				Gb-147	Lc-145	Lb-51	Lb-118

Here and There With A.S.M. Members

H. KENNETH BRIGGS, one-time assistant secretary of the American Society for Metals, is now with Miller and Co. of Chicago, who handle products of the Woodward Iron Co., Tonawanda Iron Co., and a complete line of pig iron, silveries, ferro-alloys and coke.

H. K. Briggs

Mr. Briggs is a graduate of University of Minnesota with an engineering degree which included a sound background in business and economics. For seven years he was metallurgist and assistant manager of Minneapolis Electric Steel Castings Co.

He came to the A.S.M. (then the American Society for Steel Treating) in 1926 and remained until 1932. Prior to taking his present position, he was metallurgist for Western Foundry Co. of Chicago. With Miller and Co. he will travel mostly in Michigan.

"Ken" is a charter member of the North West Chapter of the Society, and twice served as its chairman. He was a member of the Constitution and By-Laws Committee during the framing of the present constitution of the American Society for Metals.

* * *

THE Dempsey Industrial Furnace Corp. and its distributing unit, the M. K. EPSTEIN Co., have moved to new and larger quarters at 125 Main St., Springfield, Mass.

The larger plant facilities and office space will provide an opportunity for expansion in the construction of Dempsey furnaces and burners, as well as a broadening of the engineering services provided by the Epstein Co.

A long-time member of the Executive Committee of the Springfield Chapter A.S.M., Mr. M. K. EPSTEIN, head of the distributing unit, has been an influential and active member.

* * *

NOW affiliated with the technical service staff of H. Kramer & Co., Chicago, smelters and refiners of ingot bronze and brass alloys, D. M. CURRY will be available to assist brass foundries in the solution of their problems.

Mr. Curry recently resigned from the development and research department of the International Nickel Co., with whom he was connected for five years. Prior to that time, he was foundry superintendent for seven years of the Federal-Mogul Corp., Detroit, and previously was assistant foundry superintendent with the Ford Motor Co. for 11 years.

Research Jobs Announced

Further appointments of research associates are to be made at Battelle Memorial Institute, Columbus, Ohio. Young men who are university or college graduates and who have shown exceptional aptitude for research are eligible. Preference will be given to those who have majored in physics, physical chemistry, organic chemistry, chemical engineering, metallurgy, fuels or ceramics.

The research associates are brought together for a year's experience at the Institute to help bridge the gap between their academic training and their future industrial research work.

An appointment as research associate is for one year. Salary is $1800.

Applications should be submitted not later than May 1, 1940. Application forms and further information may be secured by writing to Clyde E. Williams, director.

INCORPORATION of Benedict-Miller, Inc., distributors of fine steels, has been announced at Newark, N. J.

PURDY F. BENEDICT, president, a member of the New Jersey Chapter, has been vice-president and director of sales for the Faitoute Iron & Steel Co. for the past 22 years. HARVEY L. MILLER, treasurer, was Mr. Benedict's assistant at Faitoute.

Benedict-Miller, Inc., has been appointed exclusive agent in northern New Jersey for Vanadium-Alloys Steel Co. and its affiliates, Colonial Steel Co. and Anchor Drawn Steel Co.

The new company will carry a complete line of tool and high speed steels and a well-rounded stock of hot-rolled S.A.E. alloy machinery steels and cold-finished steels.

* * *

ANOTHER newly organized Newark concern boasts an A.S.M. member as its president—namely, HAROLD M. FOSTER. Known as the Foster Steel Treating Corp., the new firm will undertake commercial heat treating.

Mr. Foster is a graduate of University of Delaware and had special work in metallurgy at Massachusetts Institute of Technology.

His experience in the steel industry began with Midvale Steel Co. in 1917. Later he was assistant in the gun forging department of Watertown Arsenal.

From 1919 to 1929 he was employed by Wheelock, Lovejoy & Co. as assistant district manager in New York City, and for the past ten years he has been manager of tool and alloy steel sales for Faitoute Iron & Steel Co.

Machinability Course Not a "Dull Grind"

By Fred P. Peters

New Jersey Chapter—The current season's second educational course—this time on "Machinability"—turned out to be a real success, as was expected from the day the idea was first broached.

A perfectly polished set of lecturers drilled the Chapter's eager knowledge-seekers in the fundamentals of taking the outside off or the inside out of metals. Anything but a dull grind, the series was lapped up by a milling crowd that averaged 120 per session, not one of whom admitted to having been bored.

Reams could be written about the topics discussed. Suffice it to say that the first lecture in the series was also the Chapter's regular January meeting, a movie-illustrated talk by Hans Ernst on "Physics of Metal Cutting" already reported in these columns; the second was a practical discourse on "Machinability of S.A.E. Alloy Steels" by G. P. Witteman, assistant metallurgical engineer, Bethlehem Steel Co.; the third a helpful treatment of "Machinability of Tool Steels" by W. E. Bancroft, chief metallurgist, Pratt & Whitney Div.; and the fourth a comprehensive discussion of "Machining of Non-Ferrous Metals" by H. P. Croft, chief metallurgist, Chase Brass & Copper Co.

The sessions were held on consecutive Monday nights, starting Jan. 15 at the Essex House, Newark. The series followed in general fashion the popular Machinability course given at the 1938 Metal Show in Detroit.

J. W. Queen, Jr. of Jos. T. Ryerson & Son, Inc., and his committee deserve the Chapter's thanks for having made its members, this year, one of the best educated groups in the Society.

National Metal Congress & Exposition
Cleveland, Oct. 21 to 25, 1940

At January Meeting in Los Angeles

At the Speakers' Table for the January Meeting of the Los Angeles Chapter Were, Left to Right: G. H. Brown, Member of the Executive Committee; Speaker F. L. MacQuarrie, President of California Cold Rolled Steel Corp.; James H. Knapp, Chairman of the Chapter; Fred B. Haldy of the Edison Storage Battery Division; and Vice-Chairman A. G. Zima

North West Officers' Night Is Diversified

By Chas. A. Nagler.

North West Chapter—A well-planned and diversified National Officers' Night opened on Jan. 8 with a bag of tricks by Conrad Houdini. He proved again that the hand is quicker than the eye, and showed himself really gifted in the handling of cards.

"Officer Mulcahy" then related his experience with metallurgists, steel treaters and chemists, et al. He attempted to convey the interpretation that the layman has for such words as thermodynamics, austempering, and others which are common to the vocabulary of the metallurgist and steel treater.

Secretary Bill Eisenman then told some tales of his travels through the country from Chapter to Chapter with President James P. Gill. Bill also told about the state of the organization and mentioned the new quarters which the Society now occupies in Cleveland.

As the speaker of the evening, President Gill, chief metallurgist of Vanadium-Alloys Steel Co., spoke on "Twenty Years of Tool Steel Metallurgy."

Deformation in Rolling Forms Interesting Topic

By John E. Wilson

Los Angeles Chapter—The January meeting proved to be very interesting for the main speaker, F. L. MacQuarrie, president of the California Cold Rolled Steel Corp., through his associations in this country and Canada, has gained a broad experience in his field.

He also has retained his enthusiasm for his subject and this, coupled with his knowledge, was responsible for the interesting manner in which he presented his talk, "Deformation of Steel in Rolling".

Afterwards the Society was shown a motion picture entitled "Giants at Work", by Fred B. Haldy, Edison Storage Battery Division of Thomas A. Edison, Inc.

The picture showed the uses of industrial truck storage batteries, and to those not familiar with this field, it was interesting to note the wide uses of this form of energy. It was also a surprise to learn that the industrial batteries do not use an acid for the electrolyte, as is customary in the more familiar types of wet batteries.

A New Book at a Special Pre-Publication Price

THE PYROMETRY OF SOLIDS AND SURFACES

by ROBERT B. SOSMAN
Research Laboratory
U. S. Steel Corporation

The rapid increase in number and variety of pyrometers in use in metallurgical plants has made a knowledge of Pyrometry important and valuable.

In this comprehensive book Dr. Sosman explains the scientific foundation of Pyrometry of Solids . . . discusses the pyrometry of metals by means of thermocouples . . . gas pyrometry . . . pyrometric controllers . . . soaking-pit pyrometry . . . heat treating and annealing pyrometry . . . and radiational pyrometry of solids and surfaces.

Up until May 1st this 100 page book is available to ASM members at the special pre-publication price of $1.50. After this date the book will sell for $2.00.

If you want a complete, up-to-date treatment of this interesting subject, write today for your copy of Dr. Sosman's book.

100 pages . . . 45 illustrations . . . 6 x 9 . . . red cloth binding . . . until May 1st . . . $1.50

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AMERICAN SOCIETY FOR METALS
7301 Euclid Avenue Cleveland, Ohio

Plastic Materials Are Made of Cheap Vegetable Matter

Bates Displays Products, Outlines Uses, Economics

Plastic materials made out of air, water, coal, limestone and cheap vegetable matter such as cornstalks and other refuse matter of the vegetable world are replacing metals in many phases of industry, A. Allan Bates, manager of the chemical and metallurgical department, Westinghouse Research Laboratories, declared at a meeting of the Rock River Valley Engineering council, on Feb. 23, at which Rockford Chapter A. S. M. was host.

During his talk, Dr. Bates exhibited large bearings and gears made of cloth which he said would outwear steel parts of the same dimensions.

He also displayed a plastic refrigerator door which his company is now using as a substitute for a steel door. Weighing a fourth less than a similar door made of steel, the plastic door is non-corrosive and serves as an excellent insulator. Finished to look like any other refrigerator door, the plastic material was made of carbolic acid, a deadly poison; formaldehyde, an embalming fluid, and cornstalks.

Dr. Bates said the average automobile of today contains hundreds of plastic materials and that experiments are now being carried out by leading automobile manufacturers in substituting plastic materials for metal fenders, bodies and tops.

It would not be impossible, he continued, for a person to drive past a cornfield, a soybean field, or almost any other growing crop one year and the next year buy an automobile largely made of the growing crop he had seen the year before.

The development of plastic materials is comparatively new, amounting to close to 200,000,000 lb. this year as compared with 1,500,000 lb. in 1921.

Dr. Bates said that plastics could never replace metals in many instances, but that their development should lower the cost of many everyday articles. The more common plastics are somewhat cheaper than metals considering their lighter weight.

Working in cooperation with the engineers in developing plastics is the National Farm Chemurgic Council which is emphasizing the great outlet for farm products through plastics.

More than 300 engineers from Rockford and surrounding communities attended the council meeting, preceded by a 6:30 o'clock banquet.

Help Wanted

INSTRUCTOR: For department of mechanical engineering of fast-growing and outstanding western university. Young man with college degree to handle elementary machine design and manufacturing methods courses, principally foundry and welding.

Address Box 3-5
American Society for Metals
7301 Euclid Ave. Cleveland, Ohio

Chapter Honors Cornell

The Southern Tier Chapter of the Society has honored Cornell University by establishing the Herman Diederichs Loan Fund.

Founded in 1939 in memory of Herman Diederichs, M.E. '97, late dean of the College of Engineering, the fund is available for loans to deserving students who have shown a genuine interest and aptitude in the field of metallurgy.

At the November meeting of the Southern Tier Chapter held at Cornell, Whitman Jordan Severinghaus, M.E. '41, was announced as the first recipient of this award.

List of A.S.M. Employment Offices

Members of the American Society for Metals who are interested in securing a new position or firms who have a position open should communicate immediately with the nearest employment office. These offices are all members of the Employment Counsellors Association of the U. S., whose Cleveland member, the Technical Placement Service, is national employment headquarters for the Society. These employment offices are maintained to benefit the firm members as well as individual members of the Society, and companies having an opening will find that these offices carry a select list of well-qualified A.S.M. technical men.

AKRON, OHIO
Merrill D. Wright
Central Vocational Bureau
203 Buckeye Bldg.

ATLANTA, GEORGIA
A. H. Benton
Personnel Service Co.
Mortgage Guarantee Bldg.

BALTIMORE, MARYLAND
H. C. Clodfelter
Personnel Service Co.
1065 Lexington Bldg.

BUFFALO, NEW YORK
E. F. Dean
Dean Employment Service
Brisbane Bldg.

CHICAGO, ILLINOIS
Bert L. Parsons
Consolidated Agencies, Inc.
209 South State Street

CINCINNATI, OHIO
E. A. Cost
Progressive Placement Service
306 Schmidt Bldg.

CLEVELAND, OHIO
T. G. Protheroe
A. R. Bradley
Technical Placement Service
504 Swetland Bldg.

COLUMBUS, OHIO
Harry C. Vaughn
Harry C. Vaughn & Associates
36th Floor, A.I.U. Bldg.

DALLAS, TEXAS
E. M. & Claude Karr
Karr Employment Service
Republic Bank Bldg.

DAYTON, OHIO
Allen G. Banks
Banks-Mitchell Employment Service
304 Keith Bldg.

DENVER, COLORADO
B. L. Johnson
Business Men's Clearing House
Midland Savings Bldg.

DETROIT, MICHIGAN
George M. Millar
George M. Millar Employment Service
National Bank Bldg.

HARTFORD, CONNECTICUT
Emory L. Wolfe
Personnel Service Bureau, Inc.
720 Main Street

INDIANAPOLIS, INDIANA
Ancil T. Brown
Brown Efficiency Bureau
806 Guaranty Bldg.

KANSAS CITY, MISSOURI
T. DeWitt Hughes
Western Employment Counselors Assn., Inc.
707 Sharp Bldg.

LOS ANGELES, CALIFORNIA
Fred M. Smith
Pacific Audit & System Co., Inc.
711 Story Bldg.

MEMPHIS, TENNESSEE
Shapiro Positions Exchange
Union Planters Bank Bldg.

MILWAUKEE, WISCONSIN
R. J. Willetts
National Clerical Bureau
6069 Plankinton Bldg.

MINNEAPOLIS, MINNESOTA
W. A. Gilman
James Hills Service
929 Plymouth Bldg.

NASHVILLE, TENNESSEE
Murray E. Hill
Murray E. Hill & Associates
Third National Bank Bldg.

NEW ORLEANS, LOUISIANA
O. F. West
Commercial Employment Agency
713 Canal Bank Bldg.

NEW YORK, NEW YORK
Albert H. Rohrer
Acorn Employment Service, Inc.
63 Park Row

OAKLAND, CALIFORNIA
Harry B. Smith
Pacific Audit & System Co., Inc.
1419 Broadway

OMAHA, NEBRASKA
Harry H. Knapp
Western Reference & Bond Assn.
834 Redick Tower

PEORIA, ILLINOIS
Harold S. Taes
Taes Employment Agency
405 Main Street

PHILADELPHIA, PA.
J. D. Stephens
Business Service Co.
1600 Walnut Street

PITTSBURGH, PA.
E. C. Coby
Coby Service Bureau
Bessemer Bldg.

SAN ANTONIO, TEXAS
George T. Ferris
George T. Ferris Service
210 Gunter Office Bldg.

SAN FRANCISCO, CALIF.
Harry B. Smith
Pacific Audit & System Co., Inc.
57 Post Street

SPOKANE, WASH.
J. I. Kinman
Kinman Employment Service
110 Howard St.

ST. LOUIS, MISSOURI
E. T. Hasselbring
Business Service Co.
16th Floor, Chemical Bldg.

SYRACUSE, NEW YORK
R. E. Taylor
Taylor Employment
333 South Warren St.

TOLEDO, OHIO
E. Siefke
Toledo Personal Service Co.
1126 Edison Bldg.

WASHINGTON, D. C.
A. C. Wright
Boyd Employment Service
1333 F. Street, N. W.

Hardenability Tests Described by Archer

(Continued from page 1)

hardness, is determined almost entirely by carbon content in the plain carbon steels and the low alloy steels. The addition of alloys in moderate amounts as in the S.A.E. steels for structural use does not appreciably increase the maximum hardness obtainable but does increase the penetration obtained in quenching.

Both the Jominy or end-quench hardenability test and the Rockwell traverse of cross-sections of bars quenched in the ordinary manner were described. In the latter, a specific method of expressing results was described in which the area under the curve of Rockwell C values is used as a measure of the hardening effect.

The Jominy test is especially suitable for deep hardening steels such as alloy steels. It is not, however, sufficiently sensitive for water hardening steels such as S.A.E. 1045, except with some modification which makes it less simple than the quenching of round bars in the ordinary manner.

An interesting discussion followed Mr. Archer's talk before 90 members and friends of Columbus Chapter.

Preceding it George N. Moffat, professor of mechanical engineering, Ohio State University, exhibited slides in a talk entitled "Colored Camera Shots of the West", which the speaker had gathered on a recent trip through the Grand Canyon.

Walter D. Kramer, chairman, presided. The only regret which was expressed was for the "man who was not there" on Tuesday, Feb. 6.

Austempering and Bainite Defined by E. E. Legge

By Joseph Missimer

Philadelphia Chapter on Jan. 26th was visited by E. E. Legge, director of research, Worcester District, American Steel and Wire Co. Over 400 members heard his paper on "Austempering" and its product "bainite".

Mr. Legge described austempering as "the method of treating steel which comprises heating it until it is substantially austenitic, quenching it into a heat-abstracting bath at some selected temperature between about 350 and 800° F., holding the steel at a chosen temperature within the range until transformation is substantially complete and then cooling to room temperature".

"Bainite", this new transformation product, he pictured as a feathery, acicular constituent somewhat similar to slightly tempered martensite in appearance which combines hardness and ductility to a degree not previously attainable by the quench and temper method of heat treatment.

Details of the process as presented by Mr. Legge have been published in a previous issue of this paper.

CHAPTER CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Apr. 15	Engineers Club	C. H. Bierbaum	Bearing Design and Construction
Boston	Apr. 5	Chamber of Commerce	J. H. Van Deventer	Heads I Win, Tails You Lose
Buffalo	Apr. 11		R. W. E. Leiter	Deep Drawing of Sheet & Strip
Calumet	Apr. 17	Woodmar Country Club, Hammond, Ind.	R. E. Nusbaum	Spectrographic Analysis in Industry
Canton-Mass.	Apr. 25	Hotel Onesta	J. P. Gill	20 Years of Tool Steel Metallurgy
Chicago	Apr. 11	Towers Club	A. S. Jameson	Hot and Cold Heading Operations
Cincinnati	Apr. 10		Joint Meeting With Dayton Chapter	
Cincinnati	Apr. 24	Columbus, Ohio		Tri-Chapter Meeting
Cleveland	Apr. 1	Cleveland Club	H. J. Fischbeck	Aircraft Materials
Columbus	Apr. 24			Tri-Chapter Meeting
Dayton	Apr. 10	Engineers Club	T. S. Fitch	Composite Steels
Dayton	Apr. 24	Columbus, Ohio		Tri-Chapter Meeting
Detroit	Apr. 8	Fort Shelby Hotel	A. B. Kinzel	Selection of Alloy Steels for Service Requirements
Hartford	Apr. 9	Hartford Gas Co. Audit.	G. E. Brumbach	Trouble Shooting of Tool Steels
Indianapolis	Apr. 15	Hotel Washington	C. W. Briggs	Design, Use of Steel Castings
Milwaukee	Apr. 16	Milwaukee Athletic Club	Hans Ernst	Machinability
Montreal	Apr. 1	Windsor Hotel	J. P. Gill	20 Years of Tool Steel Metallurgy
Montreal	Apr. 22	Windsor Hotel	G. K. Dreher	Aluminum Bronze
New Haven	Apr. 18	Conn. Light & Power Co. Audit.	H. E. Replogle	Tools for Hot Working
New Jersey	Apr. 15	Essex House, Newark	Robert F. Mehl	Age Hardening
New York	Apr. 8	Bldg. Trade Employers Assoc. Clubrooms	Paul Fifield	Metallurgical Trends in Shipbuilding
North West	Apr. 17	Minnesota Union, Univ. of Minn.	N. L. Deuble	Metallurgical Inspection
Notre Dame	Apr. 10	Engineering Audit., Univ. of Notre Dame	R. L. Templin	Mechanical Property Tests of Metals
Ontario	Apr. 5	Hamilton	R. C. Stewart	Heat Treatment of Metals
Penn State	Apr. 18	State College, Pa.	R. H. Harrington	Precipitation Hardening
Penn State	Apr. 26	State College, Pa.	H. A. Schwartz	Graphitization
Peoria	Apr. 8	Caterpillar Tractor Co.	F. G. Anderson	Quality Control of the Manufacture of Automotive & Aircraft Bolts and Nuts
Philadelphia	Apr. 26	Engineers Club	H. J. Fischbeck	Aircraft Materials
Pittsburgh	Apr. 11	Roosevelt Hotel	C. H. Herty, Jr.	Slag Control
Puget Sound	Apr. 3		Trip through Tacoma Smelter	
Rhode Island	Apr. 3	Providence Engineering Society Bldg.	R. L. Patterson	Powder Metallurgy
Rochester	Apr. 8	Lower Strong Audit., Univ. of Roch.	Ward Hamilton and Gerald Lux	"Cleaners and Finishes"
Rockford	Apr. 24	Food Shop	Henry M. Heyn	Controlled Atmospheres in Modern Furnaces
Saginaw Val. Group	Apr. 15	Fischer's Hotel, Frankenmuth, Mich.	J. L. Dostal	Permanent Mold Casting
Southern Tier	Apr. 22	Jenkins Inn, Waverly, N. Y.	Jerome Strauss	Application of Vanadium to Ferrous Metallurgy
Springfield	Apr. 15	Hotel Worthy	W. R. Breeler	
St. Louis	Apr. 19	Rolla, Mo.	Joint Meeting with Mo. School of Mines Group	
Syracuse	Apr. 9	Onondaga Hotel	J. P. Gill	20 Years of Tool Steel Metallurgy
Toledo Group	Apr. 22	Unitcast Corp.	Chas. W. Briggs	Steel Castings
Tri-City	Apr. 16			Open
Washington	Apr. 8	Dodge Hotel	G. F. Geiger	Nickel Alloys in Heat Resisting Applications
Worcester	Apr. 16	Sanford Riley Hall, Wor. Polytech. Inst.	Anson Hayes	Pressed Metal
York	Apr. 17	Harrisburg, Pa.	Emil Gathmann	Molds